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ABSTRACT

This publication summarizes research on the educational and social benefits of small schools and the negative effects of large schools on students, teachers, and members of the community, as well as the "diseconomies of scale" inherent in large schools. It asserts that research shows that measuring the cost of education by graduates rather than by all students who go through the system suggests that small schools are a wise investment. Using data drawn from 489 schools submitted to design competitions in 1990-2001, the publication concludes that small schools can be built cost effectively and that many districts are doing so. (Contains 77 references.) (EV)

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The Cost Effectiveness
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The Cost Effectiveness of Small Schools

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Executive Summary

Even though people may appreciate the benefits of small schools, too many think that the cost of such schools is prohibitive. To answer their concerns, *Dollars & Sense* summarizes research on the educational and social benefits of small schools and the negative effects of large schools on students, teachers, and members of the community, as well as the "diseconomies of scale" inherent in large schools. As the research shows, measuring the cost of education by graduates rather than by all students who go through the system suggests that small schools are a wise investment.

In addition, *Dollars & Sense* answers two fundamental questions: can small schools be built cost effectively, and has anyone done so? Using data drawn from 489 schools submitted to design competitions in 1990-2001, *Dollars & Sense* answers both questions with a resounding yes, demonstrating that small schools are not prohibitively expensive. Investing tax dollars in small schools does make sense.

Introduction

Dollars & Sense is an introduction to issues relating to school facilities that face school board members, parents, teachers, students, school administrators, policy-makers, community members, and taxpayers. Experience and research indicate that good small schools serve students, and those who care about them, better than large schools. Many decision-makers, however, are reluctant to embrace small schools for fear that they are not economical and place an unnecessarily heavy burden on taxpayers. This report will show that there are many economic arguments in support of small schools, and that it is fiscally responsible to spend school construction dollars on small school facilities. The analysis is timely, because the current school construction boom presents a matchless opportunity to create small school facilities, while, at the same time, maintaining fiscal responsibility. This report is a summary of the best information currently available on the cost effectiveness of small schools. It is our intention that additional research based on a larger database and accompanied by an integrated and comprehensive guide for the planning, design, and maintenance of small school facilities, will supplement this first report.

Note: There are many good sources for the topics covered in this report in the accompanying reference list.

Setting the Context

The Loss of Small Schools

Districts have been closing small schools for decades. Why? The answer lies in a coincidence of events and policy fueled by the prevalent American belief that "bigger is better." Reacting to the launching of Sputnik on October 4, 1957, many Americans felt that small schools must be enlarged to offer the math and science needed to meet the challenge of Soviet technological supremacy. The climate of the baby boom years and the success of big business made school administrators eager to apply business methods to education. People were ready to be influenced by James Bryant Conant, a former chemistry professor and president of Harvard University, whose book *The American High School Today*, published in November of 1958, argued for schools with at least 100 students per graduating class and guidance counselors with responsibility for 250 or more students.

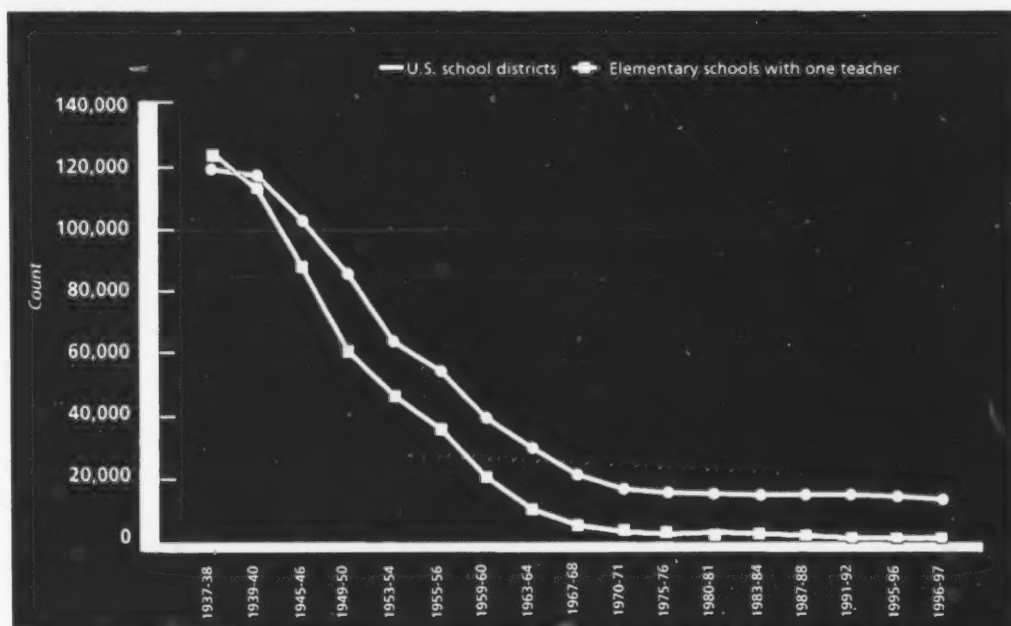
Conant argued that only larger schools could offer competitive high-level courses, particularly in math and science, at an acceptable cost. Stating, "I am convinced small high schools can be satisfactory only at exorbitant

expense," Conant said the first priority for many states should be the "elimination of the small high school by district reorganization," also known as consolidation (Conant, 1958, p. 37-38). Borrowing from the strategies of business, educators and policy-makers suggested that "economies of scale" would offset the expense of offering students advanced-level opportunities and would also justify closing small, supposedly outdated schools. It is interesting to note that although Conant has been credited or blamed for the move to close small high schools, by today's standards the schools of 400 to 500 students that he advocated would be considered small.

Coincidentally, at the same time, state and federal money was being used to build a system of highways and pave secondary roads, making it easier to bring students from a large geographic area to a centralized and in Conant's terminology, "comprehensive" high school. In addition, the migration of people from rural to urban areas seemed to require closing small schools in districts suffering depopulation.

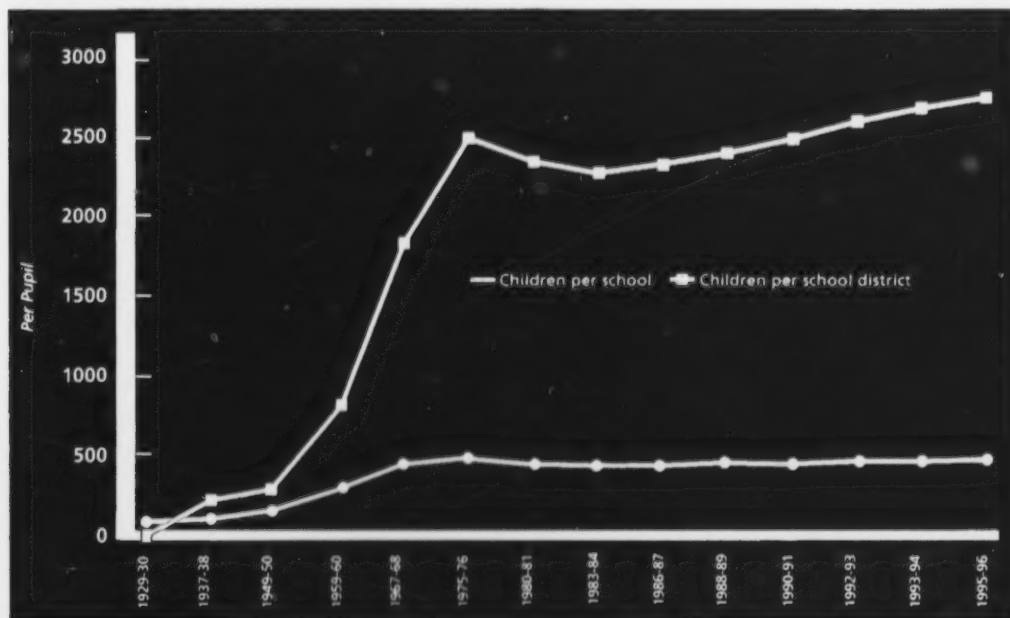
Although many communities fought the consolidation of their schools, more capitulated or accepted what they were told was in the national interest, even if it did not seem to be in the local interest. Nevertheless, both dis-

Figure 1 - School Districts and Small School Trends: Historical Data, 1937-1997



Source: Killeen and Sipple, 2000

Figure 2 - School and School District Size: Historical Data, 1929-1996



Source: Killeen and Sipple, 2000

"Since 1940 the size of the average U.S. school district has risen from 217 to 2,627 [students], and the size of the average school has risen from 127 to 653."

tricts and schools were closed. "In 1930, there were more than 262,000 public schools, compared with around 91,000 today" (U.S. Department of Education, 2001, p. 1). Put another way, "Since 1940 the number of public schools in the U.S. has declined by 69 percent despite a 70 percent increase in popu-

lation" (Bailey, 2000, p. 2) and "the number of school districts has declined since 1900 by an almost unbelievable 90 percent" (Howley & Bickel, 2001). The student population has grown, from just under 24 million in 1947-48 to a record 53.1 million enrolled in the nation's schools in the fall of 2001 (Lyons, 2000, p. 9, 10, 17). High school enrollment "climbed from 12.5 million in 1990 to 14.8 million in 2000," and is expected to continue to grow, peaking in 2002 at 15.9 million (Sack, 2001, p. 15).

Current Trends: Building Bigger Schools

One consequence of consolidation is that "[s]ince 1940 the size of the average U.S. school district has risen from 217 to 2,627 [students], and the size of the average school has risen from 127 to 653" (Walberg, 1994; Ehrich, 2001). From 1982-83 to 1998-99, elementary schools grew from an average of 399 students to an average of 478 (U.S. Department of Education, 2000). These figures, however, are low because they include new alternative schools, which tend to be small. The increase just between 1988-89 and 1998-99 averaged 55 students "and in that same period, the number of high schools with more than 1,500 students doubled. In the past 50 years, the percentage of secondary schools enrolling more than 1,000 students has grown from 7 to 25 percent" (Klonsky, 2002, p. 1). Although there are encouraging signs that people are beginning to recognize the problems inherent in big schools, in most places the trend to build larger and larger schools continues. The problem of size is more pronounced in some states than in others. In California and Florida, for example, the average high school has more than 1,400 students; six other states average over 1,000 students per high school; and five others average over 900 per high school (NCES, 2000; Agron, 2001, p. 26).

Although no source is completely accurate, government reports and other studies concur that too many of the nation's school facilities are in critical condition. In 2000, the National Center for Education Statistics estimated that it would take \$112 billion to bring America's schools up to good condition, while the National Education Association estimated the total need at \$322 billion (NCES, 2000; NEA, 2001). Unfortunately, because few states have accurate, current assessments of the condition of school facilities, it is likely that no one has a clear idea of the true needs for repairs, renovations, and new schools. What is clear is that districts are spending more on construction and renovation: in 2000 "a record \$21.5 billion in school construction [was] followed by another record of \$26.8 billion worth of school construction" in 2001 (Agron, 2001 and 2002, p. 24). A study by the United States General Accounting Office reported that construction expenditures grew 39 percent between 1990 and 1997, while enrollment grew 12 percent during that same period (GAO, 2000, p. 6).

This level of construction expenditure creates an unparalleled opportunity for school districts to re-think the issue of school size. Unfortunately, much of the money is allocated for building large new schools rather than small ones, and for new construction rather than renovation and additions. This is an important moment, full of both opportunity and peril, because schools built today will structure education for the next 50 to 75 years or longer.

State Policies that Promote Large Schools

In some states, even if local leaders are inclined to build smaller schools, state policy governing maintenance, renovation, and construction of school facilities promotes consolidation and larger schools.

Minimum Number of Students

Some states require specific minimum enrollments in order for a district to qualify for funding for school facilities. In Kentucky, for example, the School Facilities Construction Commission requires that an elementary school must have 300 or more students, a middle school 400 or more students, and a high school 500 or more students to be eligible for 100 percent state participation in capital projects. In Ohio, a school must have no fewer than 350 students to receive its full share of state construction funding, and, to qualify in West Virginia, elementary schools must have 300 students, middle

schools must have 450, and four-year high schools must have 800 students. Districts in Georgia must show both a 1.5 percent growth in the student population and a projection of at least 65 additional students per year in order to be eligible for money from the growth fund, and schools with fewer than 450 students are not eligible for funding for music and art. In other states, schools with fewer than a specified number of students are ineligible for full-size athletic facilities and must make do with a half-size basketball court (Lawrence, 2001, p. 1).

Contradictory Policy

In some states, policy is contradictory. For example, in Guidelines on Facilities Planning, the North Carolina Department of Education recommends "elementary schools ranging from 450 to 700 students, middle schools from 600 to 800 students, and high schools ranging from 800 to 1200 students...The Board also believes that schools of this size can offer the most efficient use of space and personnel at a reasonable cost per student, without losing personal contact with and among students."

The following statement, however, appears elsewhere in the same publication:

"American school leadership continues to build large public schools in pursuit of cost effectiveness and curriculum diversity, but may be sacrificing positive school culture and meaningful education reform in the process (Conway, 1994). The issue of school size, as it relates to school climate, safety, and order, has been researched extensively over more than five decades, with remarkable consistency in the findings. Most researchers have determined a measurable positive relationship of smaller school size to safety, climate, and order. Some research has controlled for 'ruralness' and revealed that it is the smallness of the school, regardless of setting, that is beneficial to the student. There is no universal agreement on the ideal size for schools. What is clear from the research, however, is the positive relationship between smaller school size and a number of variables associated with school climate and order. Researchers on school size indicate ideal school sizes for improved safety and violence reduction to be: Elementary: 300-400, Middle: 300-600, High: 400-800" (North Carolina Department of Public Instruction, 2000, p. 4, 40).

Excessive Acreage Requirements

Policy and guidelines setting required acreage for existing and new schools also pressure districts to close small facilities and build consolidated schools in outlying areas. Many states follow the Council of Educational Facilities Planners International (CEFPI) guidelines. CEFPI is considering revising these guidelines because, as the National Trust for Historic Preservation points out, requirements for excessive acreage force districts to locate schools outside of towns and contribute to sprawl (Beaumont & Pianca, 2000, p. 16-17). As of this writing, however, CEFPI still suggests one acre for every 100 students in addition to at least ten acres of land for elementary schools, 20 acres plus for middle schools, and 30 acres plus for high schools. Many states exceed even these generous guidelines in setting either suggested or required acreage for new and existing schools.

Discouraging Renovation and Maintenance

Americans' cultural preference for all that is new and big puts at risk older schools, which tend to be smaller. Americans are trained by a culture of consumerism to think that not only is bigger better, but that just being "new" is a virtue. Even people who complain that, "they don't build 'em like they used to," may ignore the fact that schools built in the "good old days" at the turn of the twentieth century were intended as public monuments and built to last much longer than those constructed mid-century.

Americans' cultural preference for all that is new and big puts at risk older schools, which tend to be smaller.

(p. 8). Unfortunately, much of the repair and renovation done during the middle of the 20th century was insensitive to the original design of older schools and also poorly constructed with inferior materials. Most school facilities built after 1950 were not as well constructed as those built earlier, nor did they offer the amenities of high ceilings, large windows, bright airy classrooms, and graceful architecture. Furthermore, most were built on slabs so it is much more difficult to change plumbing,

According to Hansen (1992): "Forty-three percent [of schools] were built during the 1950s-1960s era of cheap energy inefficient construction to meet baby boom needs. Often non-durable, they were not intended to last more than 30 years"

wiring, or heating systems than it is to accomplish similar renovations in older buildings with full basements or crawl spaces (Yeater, personal communication, July 9, 2002).

Many people point to the average age of U.S. school facilities, 42 years, as a sign that they are in poor condition, but that conclusion does not necessarily follow.

Functional age, which reflects how the building was originally constructed and how it has been maintained and renovated over the years, is a better indicator of a building's condition. Maintenance is key, and in too many districts money for maintenance is the largest budget item over which school board members and the superintendent have decision-making power. Other expenses, including salaries, textbooks, and transportation, are not optional—but maintenance can be, and is too often deferred (Rubman, 2000, p. 1-2; Lawrence, in press). Deferring routine preventive maintenance, as many people know from experience with their own houses, can lead to very serious and expensive problems.

Proper maintenance is important because many older schools, anchored in their communities, are also small schools, which may become vulnerable to closing if they are not kept in good repair. If state policy limits renovation to a percentage of the cost of building a new facility, deferred maintenance can even force the closing of a school. For example, Ohio requires that "[i]f the cost of renovating a school exceeds two-thirds of the costs of building a new one, the school district should build new." The percentage is 50 in Massachusetts, 60 in Minnesota, and 80 in Washington State (Beaumont & Pianca, 2000, p. 18). In Ohio, it is possible to obtain a waiver from this policy, but waivers are not widely sought. In Arkansas, as a "rule of thumb," if the cost of renovation exceeds 50 percent of the cost of new construction and the existing building is older than 50 years, state officials recommend building a new facility. Other states, including Arizona and Georgia, permit renovation only once, and Pennsylvania limits renovation projects to correct a deficiency to once every 20 years (Lawrence, 2001, p. 1). As recently as 1997, "[h]istoric schools in Georgia were

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ineligible for state funds because they were presumed to be obsolete" (Beaumont & Pianca, 2000, p. 44; Rubman, 2000, p. 3). Many of the schools affected by these policies are small.

School board members and administrators may be inclined to support these policies. They may think that renovation is a poor investment, because they don't recognize the value of the existing structure and infrastructure and they don't accurately estimate the costs of new construction. "Hidden costs" for new buildings may include significant expenses such as "water and sewer line extensions, student transportation, and road work" (Beaumont & Pianca, 2000, p. 18). Savings that could be

The benefits of renovating a school instead of building a new one go beyond the purely economic.

gained by continuing to use existing services (and the value of even the shell of a facility) are often omitted from the equation when school boards consider renovation versus new construction. The benefits of renovating a school instead of building a new one go beyond the purely economic. School planners may also ignore the fact that older schools have significant historic and social value as well as aesthetic appeal for the communities they serve. Existing policies, and the administrators interpreting them, have tended to dismiss concerns for historic, aesthetic, social, and community values as irrelevant sentimentality; but they are far from that. Community identity in and with the local school has, for instance, been shown to be a strong influence on early school achievement (Bickel & Eagle, 2001).

State Policies: Signs of Change

There is a slight breeze of change fluttering through the halls of some state capitols. Three states, for example, have recently considered legislation that supports small schools.

Florida

In 2000 the legislature of Florida passed Bill 235.2157, "Small School Requirements."

The Legislature finds that:

- a) Florida's schools are among the largest in the nation.
- b) Smaller schools provide benefits of reduced discipline problems and crime, reduced truancy and gang participation, reduced dropout rates, improved teacher and student attitudes, improved student self-perception, student academic achievement equal to or superior to that of students at larger schools, and increased parental involvement.
- c) Smaller schools can provide these benefits while not increasing administrative and construction costs.

The statute limits elementary schools to 500 students, middle schools to 700 students, and high schools to 900 students, and requires that "[b]eginning July 1, 2003, all plans for new educational facilities to be constructed within a school district and reflected in the 5-year school district facilities work plan shall be plans for small schools in order to promote increased learning and more effective use of school facilities" (Florida Department of Education, 2000, p. 40).

Maryland

Delegate David Rudolph, who is also an experienced educator, submitted bills to the Maryland House of Delegates in February of 2001 requiring the state to pay ten percent over the maximum state allocation for construction of schools in "priority funding areas" meeting specific size limits. Existing schools fulfilling the same requirements would also be eligible for an additional ten percent for renovation, modernization, or remodeling. (For the text of this legislation, see Appendix 2).

Vermont

Vermont has also recognized the merits of small schools and has passed legislation that helps ensure their viability. In 1998, a report by the Vermont Department of Education found that small schools in Vermont are worth "the investment because of the value they add to student learning and community cohesion," and suggested that the legislature increase funding of its small schools program, which it did (Vermont Department of Education, 1998, p. 4).

Size Matters: What Is "Small"?

Many people think that an elementary school enrolling 500 children is small. Elementary schools might span grades K-8, K-7, K-6, K-5, 2-6, or 3-4. Is a school of 500 students in grades K-8 the same size functionally as one that serves 500 children in grade 3-4? Obviously not; the grades 3-4 school of 500 students (250 per grade) is much larger than the K-8 school (56 per grade). The recommendations in this report use enrollment per grade, not total enrollment, as a guide.

Including a *wider* rather than *narrower* grade span configuration is a better way to reap the advantages of small schools. Narrowing grade spans and consolidating students in centralized schools has been used as a way to make schools larger, but schools could also become smaller by widening grade spans (see sidebar).

Is a school of 500 students in grades K-8 the same size functionally as one that serves 500 children in grade 3-4?

Making Schools Smaller with Reconfigured Grade Spans

Imagine a district that houses 1,200 students in separate buildings: a K-2 primary, 3-5 elementary, and a 6-8 middle school. Each enrolls 400 students, or 133 students per grade. If, however, the same buildings were used to house three K-8 schools, the reconfigured schools would actually be smaller ($400/9=44$ students per grade). Creating smaller schools, then, is easier than most educators and policy-makers seem to realize.

Five simple principles, drawn from research literature, are pertinent to the question of what size a school should be:

- Elementary schools are, on average, already about half the size of high schools. They should be even smaller.
- There are social and academic liabilities to narrow grade span configurations. Narrow configurations are not advisable because they enroll more students per grade than schools with wider configurations. (Ninth grade academies, K-2 primary schools, and the like will not qualify as 'small'.)
- The recommendations given concern the upper limits of small size, not "optimal sizes for a small school."¹
- The smallest schools should exist in the poorest communities.
- One size does not fit all.

Based on these principles, ideal *upper limits* of "small size" for schools with conventionally wide grade spans are as follows:

- High schools (9-12): 75 students per grade level (300 total enrollment)
- Middle schools (5-8): 50 students per grade level (200 total enrollment)
- Elementary schools (1-8): 25 students per grade level (200 total enrollment)
- Elementary schools (1-6): 25 students per grade level (150 total enrollment).

Can good schools be smaller than what is suggested here? Certainly. In fact, there should be more public high schools enrolling 200 students and more elementary schools enrolling 100 students.

¹1,000 is a large school, and so upper limits divide large from too large and must not be read as recommended sizes or optimal size.

Don't Confuse Small Schools with "Schools Within a School"

Many people realize that large schools are far from ideal places in which to teach and learn. Creating schools-within-a-school (SWaS) is one strategy for reducing school size. It is appropriate only to make use of an existing large high school building; it is not advisable to build a new facility so that it can be turned into SWaS. In more sparsely populated rural areas, a SWaS still draws students from a wide geographic area, so that many of them travel long distances to and from school. Busing is expensive and affects students and their families in many negative ways.

An alternate, beneficial strategy for using an existing large building is to reconfigure the grade span in the facility to include students from kindergarten through 12th grade. In rural areas, drawing students from a wider age range will increase the pool, narrow the geographic area in which they live, and cut their transportation time to and from school. In any area, there are many social and pedagogical benefits to bringing students of all ages together, as well as benefits from making the school more accessible to the community. The best SWaS will serve elementary, middle, and high school students within the same facility.

Another method of making the best of large facilities is to use them to house truly small schools and make the remaining space available for use by the community during and after the school day. Facilities that once served as large consolidated high schools can be leased to community agencies such as day care or senior care centers, health care centers for students, their families, and members of the community, and to other business and recreational organizations (Lawrence, 2002a). Any district with declining enrollment and excess space should consider this approach.

Emerging research (Valerie Lee and Mary Anne Raywid) suggests that it is difficult to create effective schools-within-a-school (Raywid). If it is the most feasible solution, the district should be prepared to address certain challenges. First, a school-within-a-school will likely have just one cafeteria, one gym, and one auditorium. As a result, it is important to ensure that students have equal access to these and other specialized facilities. In particular, students who are not obviously gifted and talented must be given access to facilities and opportunities to develop skills. (By contrast, this is not an issue in a truly small school in which all students are needed and encouraged to participate in after school activities.) Second, districts must work to prevent the re-segregation and re-tracking of high schools that has occurred in some SWaS (Lee). Third, schools-within-a-school should be completely autonomous if they are to overcome the inflexibility that characterizes other large schools (Raywid, 1999; Wasley & Lear, 2001; Cotton, 2001).

The use of SWaS is expedient but it is only one of several strategies to reduce school size using existing large buildings. Further work is needed to understand SWaS and to identify strategies for ensuring that they fulfill the promise of small schools. SWaS should not be seen by the public as the best way to create small schools. It would be unfortunate if SWaS were not implemented effectively and hence did not deliver the promises they make to reform education. The danger is that the public might conclude that "small schools don't work," although so much research shows that limiting size is the necessary first step in creating a truly good school.

Why Small Schools Make Sense

The trend toward building larger schools has occurred despite a surge of research and experience showing that small schools are better places in which to educate children.

Research Showing the Benefits of Small Schools

Researcher Tom Gregory from Indiana University points out that it has been over 30 years since the last study recommended large schools; nevertheless, districts have continued to build them (Gregory, 2000). The benefits of small schools have been written about so widely that

this section is limited to a summary of the argument. Many excellent sources offer further details. (See, for example, Cotton, Gregory, Nathan, Mitchell, and The Rural School and Community Trust in the References section.)

The research about the value of smaller schools shows that small schools are safer schools and better places for students to work with adults who know them and whom they trust (Barker & Gump, 1964; Wasley, 2000; Cotton, 2001). Small schools graduate a higher percentage of students. Students drop out of small schools at lower rates than they do from large schools, and more students who graduate from small schools go on to post-secondary education than do their counterparts who graduate from

large schools. There is less violence in small schools, less vandalism, a heightened sense of belonging, and better attendance. Students earn higher grade point averages, and more participate in extracurricular activities. There is greater teacher satisfaction in small schools than there is

The best small schools offer an environment where teachers, students, and parents see themselves as part of a community, and deal with issues of learning, diversity, governance, and building community on an intimate level.

in large schools. Members of the community including parents and other relatives are more involved with the life of small schools than are their counterparts in large schools—for the same reasons as their children (Cotton, 2001).

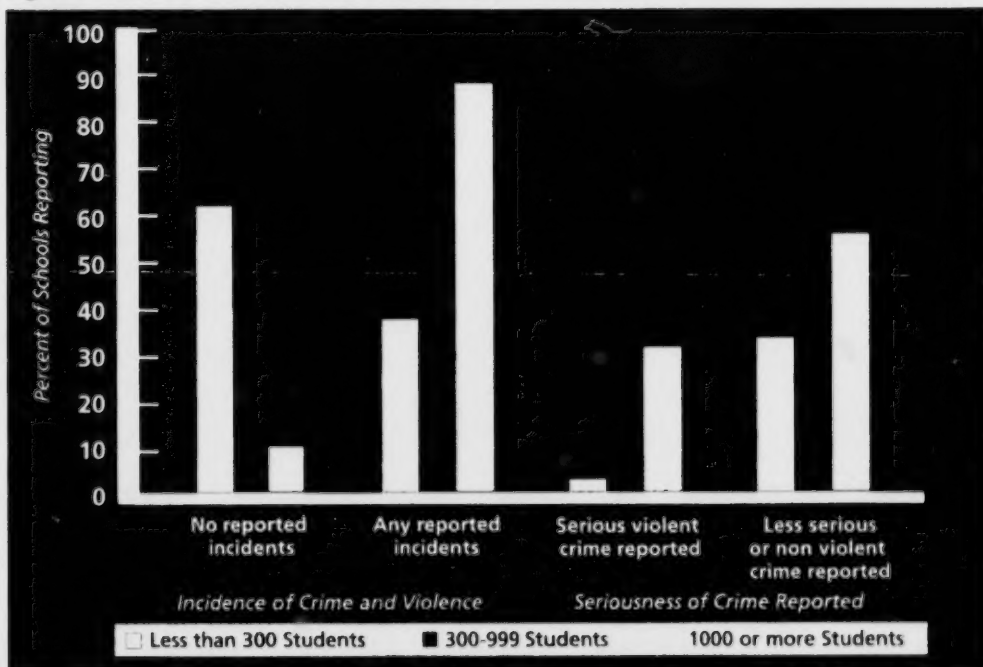
The U.S. Department of Education's report, *Violence and Discipline Problems in U.S. Public Schools: 1996-97*, further supports these conclusions:

While 38 percent of small schools reported any incidents, 60 percent of medium-sized schools and 89 percent of large schools reported criminal incidents. Serious violent crime was more likely to be reported by the largest schools. One-third of schools with enrollments of 1,000 or more reported at least one serious violent crime, compared with four to nine percent in schools with fewer than 1,000 students (1999, para. 5).

Comparing small schools (less than 300) with big schools (1,000 or more), this report shows that big schools have:

- 825 percent more violent crime
 - 270 percent more vandalism
 - 378 percent more theft and larceny
 - 394 percent more physical fights or attacks
 - 3,200 percent more robberies
 - 1,000 percent more weapons incidents
- (Source: U.S. Department of Education, 1999).

Figure 3 - Incidence of Crime and Violence by Size of School



Source: National Center for Education Statistics. (1998, March). FRSS 98-030. *Violence and Discipline Problems in U.S. Public Schools: 1996-97*, 57. Washington, DC: U.S. Government Printing Office. Available on the World Wide Web: <http://nces.ed.gov/pubs98/violence/98030004.html> <http://nces.ed.gov/pubs98/98030.pdf>

School size is arguably more important than either racial makeup or class size, according to at least one analysis. *The Report Card on American Education* (2001) noted that higher outcomes on standardized tests, such as the SAT and the ACT, as well as higher rates of graduation, may be connected more with school size than with race (LeFevre & Hederman, 2001, p. 3). The study also found that school size, not classroom size, was the key to student performance. Children performed better in schools where the principal knew their names. Schools with fewer than 300 students showed the best performance, even though class size in these schools was higher than the national average (RCAE, 1994). Similarly, Bickel and Howley show that the effects of class size and school size are different and to some extent separate. It is true that smaller schools tend to have smaller class sizes. But even when the influence of class size is included in studies, the influence of school size remains strong. District size also generally exerts a distinct influence (Bickel & Howley, 2000).

How Small Schools Make a Difference

Small schools are not effective solely by virtue of being small. Rather, small schools work best when they take advantage of being small. The best small schools offer an environment where teachers, students, and parents see themselves as part of a community, and deal with issues of learning, diversity, governance, and building community on an intimate level.

At least one study spotlights the mechanisms by which small schools become more effective than large schools. Lee and Smith (1994) used data from the National Educational Longitudinal Study (1994) to show that small schools increased teacher collaboration and team teaching. Lee and Smith report that "large size and fragmented human contact complicate the management of [large] schools, which elevates the importance of formal rules to regulate behavior. The environment in comprehensive high schools is therefore less human" (p. 2).

The Met in Providence, Rhode Island: An Effective Small School

On June 9, 2000, 43 young people received their high school diplomas from the Metropolitan Career and Technical Center—the first graduating class of a unique, state-funded high school in Providence, Rhode Island. Almost every high school can boast a few success stories—students who have reached beyond what they or anyone else thought possible for them. But...no one graduating from the Met has to feel like the "exception." Every Met graduate applied and was accepted to at least one college, many receiving substantial financial aid packages (totaling \$500,000)—an unusual circumstance for an urban school in which 70 percent of the students are children of parents whose education did not go beyond high school. All but 3 plan to enter college in the fall. Interestingly, those who plan to defer are all from college-educated families.

Upon entering the Met, the class of 2000 looked very much like their peers in the Providence school system. In fact, the composition of the graduating class is an almost perfect mirror of the Providence schools: 52 percent of the students qualify for free lunch; 22 percent are African American, 38 percent Hispanic, and 38 percent white. School records reveal that the first cohort included a substantial number of students who entered the Met two or three years behind grade level in skills. The group ranged from students who had repeated or were about to repeat a grade to students assessed as gifted and talented, with most clustering at the lower end of the achievement scale—getting by, receiving passing grades, yet not developing the skills necessary to succeed in college and careers.

At the Met, these students found themselves in a school like no other they had ever attended, or probably even imagined. Instead of being handed a schedule of classes, each student plots how s/he will make progress towards the school's learning goals in a quarterly meeting with a team including a teacher-advisor and a parent. Instead of spending their school day in classes, they fashion independent projects through which to explore their interests and meet their learning goals. Instead of tests, they do quarterly exhibitions of their work and accumulate a four-year portfolio. Instead of seeing six or seven different teachers and groups of peers each day they spend intensive time with one advisor and advisory group (of 13-14 peers) and with adults in the community who mentor them in an interest area.

The article above is an excerpt from "Forty-three Valedictorians: Graduates of the Met Talk About Their Learning" by Adria Steinberg. Reprinted with permission from the Big Picture Company.

Adding up the costs and weighing them against the benefits shows that small schools not only are better places in which to educate children, but that large schools themselves actually create significant diseconomies.

Small schools are more flexible and responsive, because there is less formal bureaucracy, and because people are known to each other.

People cannot connect in the same ways in a large school, because intimacy is impossible and students are anonymous. There are many examples of small schools taking advantage of their size to do outstanding work with students.

13 percent loss (Steifel et al., 1998, p. iii-v). This finding is particularly encouraging because the small schools served a higher percentage of poor students and part-time special-education students than did the large schools.

Using similar methodology to that used in the New York study, researchers reported in 1999 that in Nebraska small schools out-performed larger schools in both the percentage of students graduating and the percentage going on to post-secondary education. While the state high school graduation rate averaged 85 percent, school districts with 600-999 high school students had an average of only 80 percent of their students graduate. For high schools in districts with fewer than 100 students, however, the graduation rate averaged 97 percent (Funk & Bailey, 1999, p. 3). Researchers concluded that:

By two important measures of student outcome, smaller schools in Nebraska generally perform better than larger ones. The additional input cost of supporting students in smaller schools needs to be weighed against their more positive educational outcomes. The so-called inefficiencies of small schools are greatly reduced when calculated on the basis of cost per graduate, and virtually disappear when the substantial social costs of non-graduates and the societal impact of college-educated citizens are considered (p. 3).

Reassessing "Economies of Scale"

Many school leaders are willing to acknowledge the research and examples cited in the opening pages of this report. Nevertheless, the idea persists that however beneficial small schools may be, they are prohibitively expensive. This report finds a contrary result by looking more closely at the supposed economies of large schools. Adding up the costs and weighing them against the benefits shows that small schools not only are better places in which to educate children, but that large schools themselves actually create significant diseconomies.

Cost per Graduate: Different Places, Similar Results

Researchers at New York University's Institute for Education and Social Policy examined 128 high schools using school-by-school budget information for 1995-96. They found that schools with fewer than 600 students spent \$7,628 per student annually, \$1,410 more than was spent by schools with more than 2,000 students. The cost per graduate, however, at the small schools was \$49,553, slightly lower than the per-graduate cost of \$49,578 at larger schools. This is because dropout rates at the small schools were much lower—64 percent of small-school students graduated in four years compared with 51-56 percent of the students in large schools with 1,200-2,000 or more students. Schools with fewer than 600 students had a five percent drop out rate, while larger schools averaged a

Measuring per graduate instead of per student cut the annual cost differences between the smallest schools and the larger ones in half.

Measuring expenses by the cost of educating a student who graduates makes sense. Once it is mentioned, it seems strange that for years schools have calculated costs by counting students who drop out in the same measure with students who graduate with marketable skills and/or go on to postsecondary education. The term "economies of scale" was borrowed from the business world, so it seems only fair to use a business-like method of measuring results. No viable business would include the costs of "producing" (educating) a "product" (students) that didn't meet certain "quality controls" (graduation requirements) to measure its costs and rate of success in the marketplace. Both the Nebraska study and its counterpart in New York show that, measuring by the cost of a graduate, small schools are good financial and educational investments.

The Social Costs of Large Schools

Students drop out of large schools at significantly greater rates than they do out of small schools. The costs to society for students who drop out of high school before graduating are enormous—incalculable in terms of loss of productivity and effects on the individual and members of his or her family. Dropping out of high school influences a person's health, chances of being on welfare, chances of getting a job, chances of going to prison, and his or her relationships with family members. In 2000, 10.9 percent of young adults aged 16-24 were not in a high school program and had not completed high school. Although students of low-income families are six times more likely to drop out of school, still 57 percent of dropouts come from middle-income families, which represent about 60 percent of the population. In 2000, 13.1 percent of African American students dropped out before completing high school and Hispanic students, particularly those facing language barriers, were also more likely to drop out than were white students (27.8 percent vs. 6.9 percent) (NCES, 2000).

Almost half of the people who are heads of households receiving public assistance are dropouts. Dropouts are almost three times more likely to receive assistance than graduates who did not go on to college (17 percent to six percent). This is expensive in human and monetary terms: "[I]n 1999, there were 2.7 million families on welfare receiving an average monthly payment of \$363 (\$4,344 per year), plus an average monthly allotment for food stamps of \$52 (for a family of four)" (Urban Institute, USDA Food and Nutrition Services).

Dropping out of high school makes it likely that a person will earn one-third less than his or her classmates who graduate, and it is less likely the dropout will find work. The U.S. Department of Education claims that in 1997, "67 percent of recent high school completers not enrolled

Students drop out of large schools at significantly greater rates than they do out of small schools. The costs to society for students who drop out of high school before graduating are enormous.

in college were employed, compared with 45 percent of recent high school dropouts" (U.S. Department of Education, *The Condition of Education*, 1999). This is a loss of productivity not only to the individual, but to the society as a whole.

Success in high school is a necessary step toward earning a college education. Educational attainment is associated with social and physical health. People who have graduated from college are twice as likely as those without a high school diploma or GED to report being in excellent or very good health, and parents who lack a high school degree are more likely to be involved in incidents of child abuse and neglect.

Perhaps the worst indictment of large schools with high dropout rates is the fact that dropouts are three-and-one-half times as likely as high school graduates to be arrested and 82 percent of inmates in the adult criminal justice system are dropouts (Coalition for Juvenile Justice, 2001, p. 10). On December 31, 2000 there were almost 1.4 million people in federal and state prisons, and in 1996 the average annual cost was \$20,100 per prisoner (U.S. Department of Justice). In contrast, in 1996-97 an average of \$5,923 was spent per student (U.S. Department of Education, 1999, p. 1). This astounding difference of \$14,177 per year suggests the magnitude of savings possible from small schools.

Operational Diseconomies of Large Schools

Administration

While it may be true that in small schools some costs increase because they are spread out over fewer students, research suggests that large schools require added tiers of administration, more security people, and additional maintenance and operations personnel. The reason for this may be that in large schools more students feel alienated from the life of the school and some vent their anger in inappropriate or violent behavior. Therefore, it takes more paid professionals per student to deal with the negative effects of alienation in a large school than in a small one, where people know each other better.

The increased cost of salaries, workspace, and other operational expenses offsets expected savings from consolidating small schools (Lee & Smith, 1996; Cotton, 1996, 2001). Cotton explains, "the required disciplinary and other administrative personnel of large schools are so costly that, past a certain point, per pupil cost goes up—

It takes more paid professionals per student to deal with the negative effects of alienation in a large school than in a small one, where people know each other better.

and keeps going up as the school grows larger" (Cotton, 2001, p. 19). Not only is the higher ratio of staff to students a financial burden, it also makes larger schools less able to be flexible in making decisions, reacting to students as individuals, and building a successful community.

Guidance

Conant based his suggestion that guidance counselors work with no fewer than 250 students on the premise that specialized counselors would be more effective than generalists, and could work with large numbers of students. In comparison, however, with the system of advisors used in many small private schools and some small public schools, the system of guidance counselors is both ineffective and expensive. A trained guidance counselor who has responsibility for 250 or more students cannot hope to know them as well as an advisor who works with a small number of the same students every day, sometimes throughout the student's years at the school. An advisor may suggest specialized intervention if the student seems to need extra help with a medical, psychological, or family problem, but his or her primary function is as a student's guide, mentor, and ombudsman. The advisor system is not only more efficient, but also, most importantly, it is more proactive and helpful to students and their families than a system in which many students get to know their guidance counselor only when they get into trouble and too many get lost in the impersonal culture of a large institution (Ellis, 1990; Lawrence, 1998, p. 261).

Transportation

Another diseconomy of scale in large schools involves the transportation of students. Each school day in the United States about 400,000 buses travel over 21 million miles (Mitchell: 5). Often left out of a comparison of costs, transportation—including fuel, buses, bus drivers, maintenance, and time lost from the classroom—constitutes a powerful disincentive to consolidation. In fact, "[t]he cost (in constant dollars) of transporting public school students has increased every year since 1929, reaching nearly \$10.4 billion in 1995-96, double the amount spent 25 years earlier" (Strange, 2001, p. 4). This growth exceeds the rate of increase in student population, indicating that per pupil transportation costs (as well as the total cost) are rising. Figured by cost per student, transporting rural students is more than twice as expensive as

transporting urban students and nearly 50 percent more costly than busing students in suburban districts (Killeen & Sipple, 1997; Beaumont & Pianca, 2000).

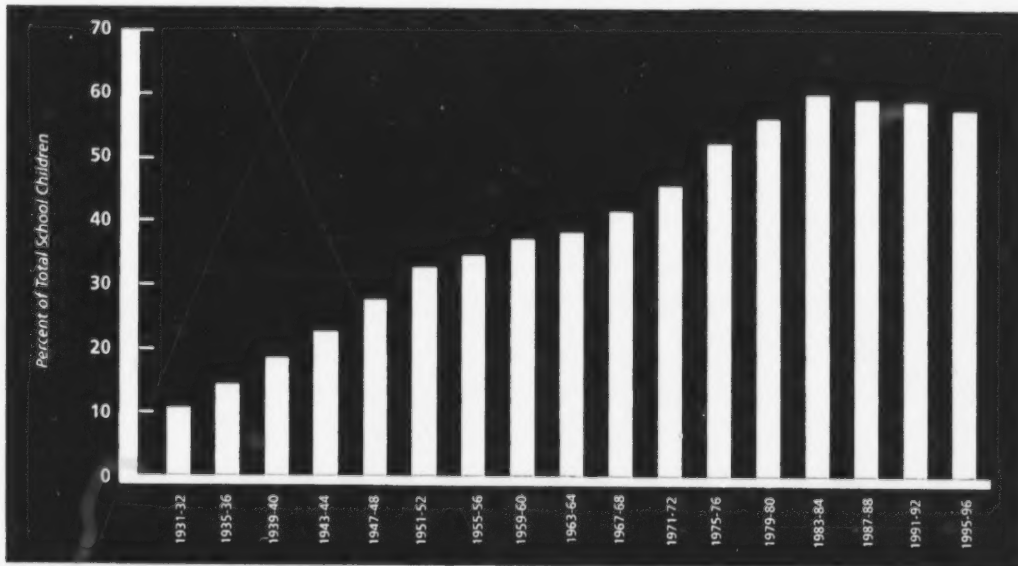
By contrast, when schools are small, students frequently can walk to and from school, or reach it with a half-hour bus trip (and their parents, friends, and relatives also have easy access). Expenses for transportation are

Students who spend less time on the bus are able to spend more time with family and friends, in community activities, and even on homework.

thereby reduced and additional benefits ensue: more students participate in after school activities and more people in the community attend events, classes, and use the school facilities on a regular basis. These connections strengthen student achievement as well as community involvement in and support for the school. Students who spend less time on the bus are able to spend more time with family and friends, in community activities, and even on homework. Involvement with their families and communities is a no-cost benefit of smaller schools that helps students to live better and richer lives, and to connect more fully with their school as well (Beaumont & Pianca, 2000; Howley & Howley, 2001).

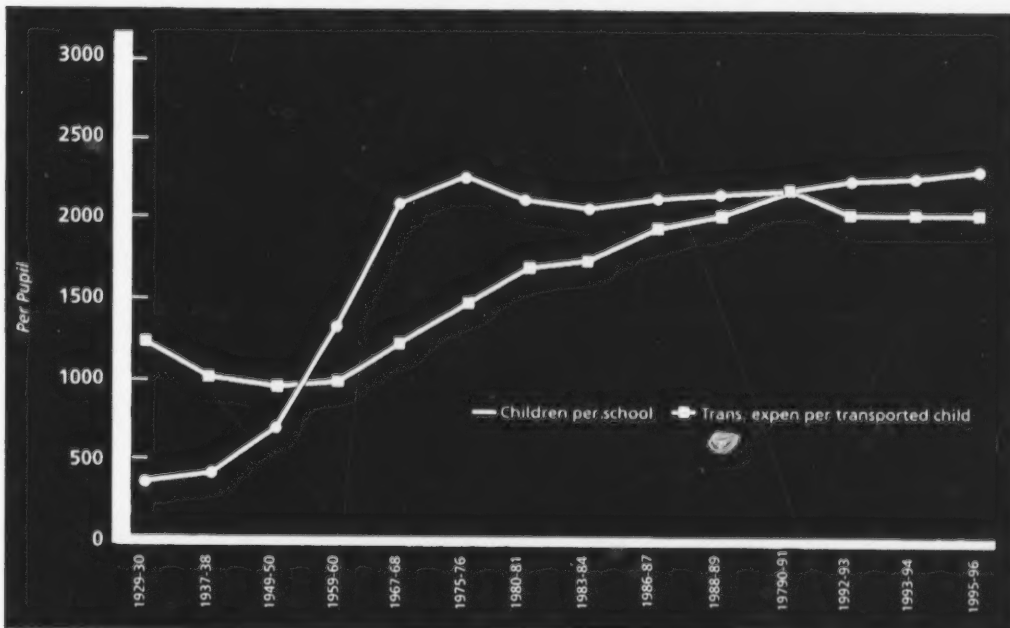
Figure 4 - The Cost of Busing

U.S. Public School Transportation Costs: Constant Dollars '95, 1931-1996



Source: Killeen & Sipple, 2000

Figure 5 - Transportation Costs Escalate with Organizational Size:
Historical Data, 1929-1996



Source: Killeen & Sipple, 2000

The Consolidation Blues: A Cautionary Tale

Two Southeastern Nebraska school districts, Diller and Odell, learned that school consolidation isn't always the answer. Milford Smith, former superintendent of Odell Public Schools, says that this scenario is being repeated all over Nebraska. He tells this story to indicate that bigger schools are not always more efficient.

In 1998-99, Diller Community Schools had approximately 160 students in grades K-12. They had recently passed a bond issue for remodeling and renovation and had closed a small elementary school due to general disrepair. Fiscal problems forced the school to combine some elementary grades and eliminate the guidance counselor's position.

Meanwhile, neighboring Odell Public Schools had an enrollment of approximately 190 K-12 students. They had also passed a bond issue to do remodeling and replace a K-6 building. Declining enrollment forced Odell to enter into an agreement with Diller whereby the eight-member football team played at Diller and the volleyball and basketball teams played at Odell.

When Nebraska state aid was reconfigured in 1997-98, Diller lost approximately \$75,000 in one year. To make up for the shortage, Diller would have had to combine elementary grades even further, cut back on supplies and texts, and use all of its cash reserves. Even with these cutbacks, the district would still have to have over-ridden the limits on property taxes. Instead, Diller and Odell decided to consolidate. They framed the merger as a means of enhancing educational opportunities, solving Diller's fiscal problems, and creating a new, larger district that would save money.

The new district bought out eight teachers and one part-time Superintendent and gave one Superintendent early retirement, for a total of \$122,000. The size of the new district meant a \$1,500 increase in the base teacher salary, plus salary increases for teachers with advanced degrees, for a total of \$92,000. Salaries for the new principals and an increase in benefits for non-certified personnel came to a total of \$90,000. An additional 25,860 miles was added to the transportation cost of busing students. At a state rate of \$1.10 per mile, the added expense totaled \$28,500. With more students in all grades, the curriculum needed to be aligned so that all of the students were working from the same textbook, a cost of \$50,000. New band uniforms and athletic equipment totaled \$27,000. The new district was big enough to move from an eight to an eleven-member football team, so the cost of improving the athletic facilities came to \$41,000. New locker rooms at the Odell high school and a new football program at Odell Junior High were also added. Diller, however, did not want to lose all of their sports, so they enlarged their football field to an 11-member size, which entailed acquiring more land and moving all of the light poles. Add in attorney fees, and the total spending above base year expenses comes to approximately \$460,000. For the 2001-02 school year, [and for each subsequent year] the expenditures above base year expenses are estimated to be \$230,000. So much for saving money.

The above article is an excerpt from the January 2002 issue of Rural Policy Matters, The Rural School and Community Trust's policy program newsletter.

Costs to a Community of Losing a School

Often overlooked in the debate over school size and consolidation are the many ways in which schools nourish their local communities. Schools contribute significantly to the vitality of local economies and are essential to a community's long-term development potential. Schools foster community cohesion and may increase civic participation. These considerations are especially relevant to small towns weighing the costs and benefits of consolidation, but they can also help guide decisions about the size and location of urban and suburban schools in order to maximize their value to surrounding neighborhoods.

Economic Vitality

In small towns, the closure of a school often means the loss of a major local employer with a significant annual budget and payroll. Charles H. Sederberg of the University of Minnesota examined six rural Minnesota counties and found that the school district payroll accounted for between four and nine percent of the total county payroll. The purchasing power of both the school districts and their employees was substantial. District expenditures ranged from one to three percent of the county's total retail sales, while the take-home pay of employees ranged from five to ten percent of total retail sales. (See also Lyson, 2002, p. 21-24.)

Sederberg's interviews with local bankers revealed that most believed that school payroll and expenditures significantly increased the amount of capital available for loans, one of the many ways schools benefit local businesses. The closure of a school can be particularly hard

A larger number of Midwestern towns that had lost their schools to consolidation were losing population at a faster rate than those towns that had maintained their local school. As population falls, home values drop and businesses struggle.

on retail stores. Sales from students and teachers evaporate, while parents do more of their shopping near their children's new school. When consolidation led to the closure of the high school in Lund, Nevada, retail sales dropped eight percent (Petkovich & Ching, 1977). In North Dakota, a survey of residents in communities that underwent consolidation in the early 1990s found that most residents believed that retail sales, as well as the number of businesses in town, had

declined after the schools closed. Two of the towns lost their local grocery stores, which had depended heavily on school purchases (Sell et al., 1996).

The economic impact of school closure is often overlooked not only by those towns considering consolidation with another district, but by the many communities abandoning older, centrally located schools in favor of new facilities on the edge of town. Healthy, resilient downtown areas succeed in part by serving a variety of needs. They are centers of both commerce and community life, combining private businesses with public services like schools and post offices. When schools and other services move out, downtown commerce invariably suffers as more of the community's activity shifts to the fringe. Residential subdivisions and chain store sprawl soon follow, eliminating open space and increasing traffic congestion, and further undermining the community's historic center.

While good schools enhance property values, bad schools and the lack of a neighborhood school cause property values to decline. Without a local school, both small towns and urban neighborhoods will be unable to attract young families. Out-migration will increase. Researchers

William Dreier and Willis Goudy (1991) found that a larger number of Midwestern towns that had lost their schools to consolidation were losing population and at a faster rate than those towns that had maintained their local school. As population falls, home values drop and businesses struggle. Once this spiral of disinvestment and decline begins, it can be very difficult to turn around.

Conversely, good schools can drive economic development. A community's overall quality of life and the quality of its public services are increasingly important factors in attracting skilled workers and new investment. A study of rural communities in South Carolina found that those with better schools (as measured by educational spending, class size, and test scores) experienced significantly higher levels of job growth compared to those with lower quality schools. The relationship between schools and economic well-being was particularly strong for isolated communities far from urban centers (Barkeley, 1996). High quality small schools can therefore be among a community's most important economic assets.

Community Cohesion

Schools anchor and unify communities by bringing residents of all ages and backgrounds together for a variety of activities and services. Schools often double as community and cultural centers. They are places where people can watch or play sports, attend a dance, take in a play, hold meetings, or organize political forums. Schools house numerous services: branch libraries, healthcare centers, pools, playing fields, and community education classes.

Perhaps more than any other institution, schools are responsible for a sense of community and collective identity. Local schools educate generations of friends, family, and neighbors, providing a shared experience and

In rural North Dakota, researchers surveyed residents of eight small towns. Those that had lost their school to consolidation reported declining participation in local organizations and activities. They also rated their quality of life significantly lower than did residents of communities that had retained their local schools.

continuity from one generation to the next. Local schools have much to do with a community's sense of its own identity. Nowhere is this more apparent than in the affiliation with a school's sports teams.

For rural communities especially, the closure of the local school can leave a gaping void. A case study of Lund, Nevada found that one-third of all community activities took place at the school (Petkovich & Ching, 1977). In a study of the state's small schools, the Vermont Department of Education likewise concluded, "In many cases the small school is the only 'place' for the community to come together" (1998, p. 4). One-quarter of the towns studied had no grocery stores, restaurants, post offices, or other places where residents could meet one another. In rural North Dakota, researchers surveyed residents of eight small towns. Those that had lost their school to consolidation reported declining participation in local organizations and activities. They also rated their quality of life significantly lower than did residents of communities that had retained their local schools (Sell et al., 1996).

Civic Participation

One aspect of school consolidation rarely discussed, and even more rarely studied, is the impact school closure has on civic participation. As schools have consolidated and grown larger, decision-making authority has been transferred from local communities into the hands of state officials and school administrators. Local citizens have increasingly less say over such matters as curriculum, educational standards, budgets, and teacher qualifications, and are less and less involved in the day-to-day school operations. Perhaps most significantly, consolidation has dramatically reduced citizen participation in the governance of the nation's education system. Between 1930 and today, the number of people serving on school boards fell from 1 million to fewer than 200,000 (while U.S. population doubled).

Although there has been very little empirical research to date, some believe that the loss of local citizen control over schools has reduced civic participation more broadly. Howley and Bickel point out, for example, that the loss of 90 percent of school districts, "has also removed a proportionate number of citizens from the governance of public schools. Public schools are therefore less 'public' than ever" (Howley & Bickel, 2001). It is not unreasonable to think that the closure of a local school would make people more apathetic and less likely to vote in

school board elections and to endorse school bonds and increases in education spending. Declining participation in school elections may have a spillover effect, reducing overall voter turnout and more general citizen involvement in government affairs. To the extent that serving on a school board gives people the encouragement and experience needed to run for other offices, the decline in school board seats may be reducing the pool of citizens seeking to serve in government.

Strategies for Strengthening Small Schools

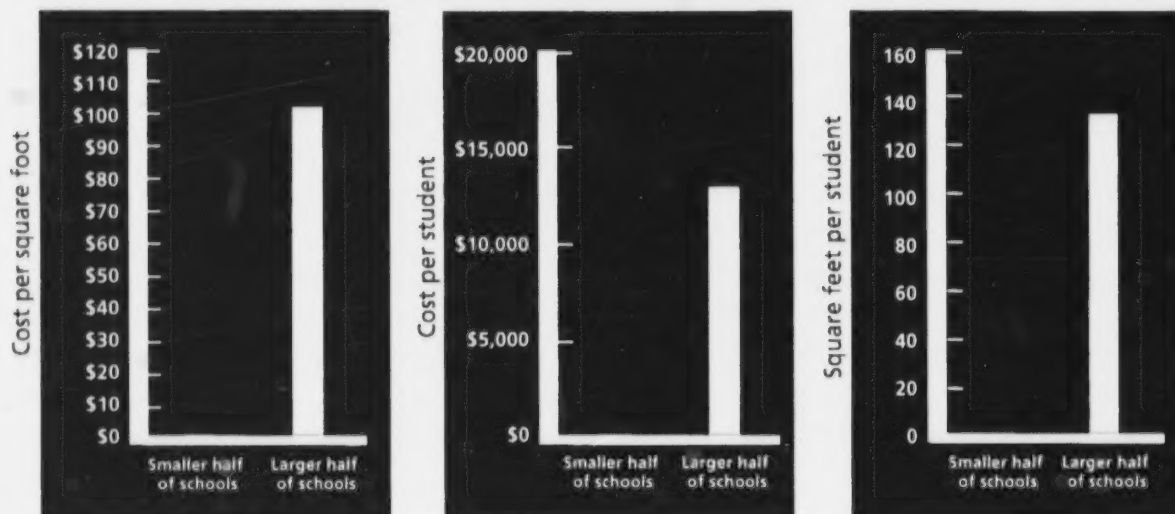
New Highways

In 1957, America was just beginning to envision a nation connected by superhighways. Today, the United States is a nation connected by information superhighways that transcend the limits of geography and give people opportunities to communicate with others they will never meet. Just as books and graphic images allow Americans to communicate with people from other nations and periods of history, so does the Internet. Anyone can travel beyond the limits of geographic barriers and boundaries. Students anywhere can learn through special classes taught by experts in a college or university miles or even oceans away, yet be monitored and supported by local teachers, who might take the course for re-certification credits. For other specialized classes, it may make sense for districts to share teachers, having them travel rather than busing large numbers of students.

Partnerships and Shared Use of Facilities

Forming partnerships with other organizations can create a win-win situation. Many districts have found partners within the community for public and private facilities that can offer specialized programs for students. Other schools lease space in facilities that are under-used, including weekend and vacation time, to public and private organizations, thereby sharing expenses. *Smaller, Safer, Smarter Successful Schools*, by Joe Nathan and Karen Febey, offers 22 examples from around the country of schools that have made partnerships with their communities in ways that help each become more sustainable.

Figure 6 - Data for 489 Schools in Study Database



Cost per square foot: 109 (smaller half); 104 (larger half)

Cost per student: \$15,709 (smaller half); \$12,977 (larger half)

Square feet per student: 151 (smaller half); 131 (larger half)

Larger half are schools larger than median size of schools in study database.

Medians are: 93 students per grade for elementary schools, 267 students per grade for middle schools, and 375 students per grade for high schools.

Can Small Schools Be Constructed Cost Effectively?

It is essential to answer the question: can small schools be built cost effectively? With limited resources available to cover a broad range of needs, and with taxpayers demanding strict fiduciary responsibility, school boards, superintendents, and facilities executives must usually recommend the most economical solutions to facilities needs. The definition of what is economical, however, is most often determined through generic formulas established in the real estate and construction industries for a wide range of institutional, commercial, and residential building types. In most cases, the analysis is limited to the direct capital costs of real estate and hard construction, and may be misleading. Even though many people think that smaller schools are better places in which to teach and learn, some districts continue to build large schools simply because they fear that small schools are more expensive to construct. Conventional wisdom contends that small schools are substantially more expensive to build than large schools, but the evidence presented above challenges that belief.

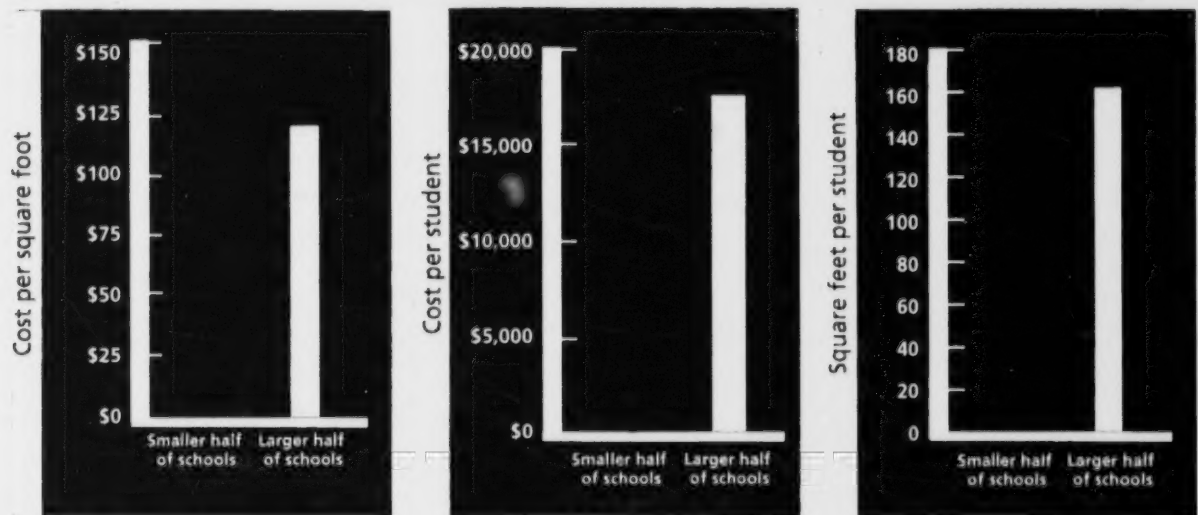
Finding an Answer

In order to answer the questions: can small schools be cost effective to construct and has anyone done so, the authors assembled a database of 489 school facilities

Conventional wisdom contends that small schools are substantially more expensive to build than large schools, but the evidence . . . challenges that belief.

projects constructed between 1990 and 2001 that were submitted to design competitions. The analysis of this database is a forerunner to the more extensive work that is needed, but it illustrates that smaller schools can be cost effective to build. These 489 schools were designed to house from 24 to 4,000 students—a very wide range of sizes. The largest

was a high school, but the largest elementary school, in fact, was designed to hold 3,000 students. Clearly, many of these schools exceed the maximum sizes recommended in this paper and by many professional organizations and educational experts (see Appendix 3).

Figure 7 - Data for 145 Reasonably Sized Schools²

Larger half are schools larger than median size of schools in 145 school subset of study database.

Medians are: 65 students per grade for elementary schools, 205 students per grade for middle schools, and 170 students per grade for high schools.

² No larger than 1,000 students total enrollment in high schools, 750 in middle schools, and 500 in elementary schools.

Costs for All Schools

The first step of the analysis was to compare the "larger" and "smaller" schools by dividing them into six groups, those larger than and those smaller than the medians at three levels: elementary, middle, and high school.¹ The next step was to compare cost per square foot to build the schools (a figure favored by architects) and cost per student (a figure favored by school boards). Comparing the cost of construction for all the schools in the database, the cost per student to build smaller schools is about twenty percent higher (\$15,709 versus \$12,977), than the cost to build larger schools. The cost of \$5.00 more per square foot, however, is only about five percent higher (\$109 versus \$104). These are relatively small differences, particularly in light of the overall benefits of small schools and their concomitant savings to society as a whole.

¹Median size was determined by grade level for these 489 schools according to number of students per grade. Medians were 93 students per grade for elementary schools, 267 for middle schools, and 375 for high schools. In the case of a 9-12 high school, the number 375 indicates a total enrollment of 1,500 students: a size that exceeds the most conservative of the upper limits proposed for high school size.

Costs for Reasonably Sized Schools

The next phase of analysis compared the cost of constructing small schools and those that are larger but still within more reasonable size limitations than mega-schools. "Reasonably sized" for this purpose meant the 145 schools in the data set that met generous suggestions for the upper limits of school size: 1,000 students for high schools, 750 for middle schools, and 500 for elementary schools. Dividing these schools into "smaller" and "larger" groups at the mid-point of size for each level (elementary, middle, and high school), created the same six categories used in the first phase of analysis, but produced markedly different results.⁴ Analysis of this database shows that the smaller of the reasonably sized schools are less expensive to build than the larger schools, looking either at cost per square foot or at cost per student: \$105 versus \$120 (cost per square foot), and \$16,283 versus \$17,618 (cost per student).

⁴The median number of students per grade in the group of 145 smaller schools is: 65 (elementary), 205 (middle), and 170 (high school).

Other information about the 145 schools in this data set explains these surprising results. The smaller schools include more grades (five instead of four) and allocate

Analysis of this database shows that the smaller of the reasonably sized schools are less expensive to build than the larger schools, whether we look at cost per square foot or cost per student.

fewer square feet per student (151 versus 161). Their slightly cheaper cost per square foot, combined with the allocation of somewhat fewer square feet per student, yields a cost per student that is also lower than that of the larger schools. From this initial research, however, it is not clear why larger schools chose to provide more square feet per student or were more expensive to build per square foot. A key question in the next stage of this project will be to study why that has been the case and to ask, are the extra square feet necessary for the additional administrators or functions required in larger schools, or do the extra square feet benefit students directly?

Discussion

It is possible to answer both questions—"Can small schools be cost effective to construct?" and "Has anyone found a way to build smaller schools cost effectively?"—with a clear "yes." The statistics presented here illustrate that smaller schools can be less costly to build than larger ones, if reasonable rules limit the size of schools to something smaller than "mega-schools." Furthermore, the cost per student is only *somewhat* higher even when comparing schools in the widest size range. Taking into account the enormous costs to society of large schools, the answer is clear: small schools can be cost effective.

Furthermore, this analysis *clearly* stands as a counter-example to prevailing views; it is what mathematicians call an "existence proof." It shows not only that smaller schools can be constructed in a more cost effective manner than larger ones, but also that some school districts have actually made the rational choice to build smaller schools. A different data set, in Appendix 4, also shows (1) that school districts are building small schools, and (2) that there are not significant cost variations between smaller and larger schools. The "common wisdom" that small schools are not feasible because they are significantly more expensive to build than large schools simply does not hold true in the sample of model schools analyzed in this paper.

Conclusion

Many people know intuitively that small schools work best for children and teachers, but now there is research to prove it. Unfortunately, many communities have already lost their good, small schools because they could not argue successfully against educators and policy-makers determined to implement "economies of scale" through consolidation. Now, it is clear that there are significant diseconomies in large facilities, and that they do not create the best schools in which to nurture or educate children. It is important to preserve good small schools, limit school size, and reconfigure narrow-span large schools to achieve smaller schools within schools. Best of all, this report indicates that creating facilities for small schools can be done cost

[C]reating facilities for small schools can be done cost effectively, and . . . in fact, the cost of large schools is higher considering their negative outcomes.

effectively, and that in fact, the cost of large schools is higher considering their negative outcomes.

Large schools are expensive to individuals, their communities, and the nation because there are many hidden costs. Most obvious are expenses such as increased transportation, higher admin-

istrative overhead, and expenditures for maintenance and security. Other costs of large schools are more subtle: lower graduation rates, higher drop out rates, high rates of violence and vandalism, higher absenteeism, and lower teacher satisfaction. Loss of a school has enormous social and financial impacts on a community, and consolidating schools and districts even erodes participation in democracy; but perhaps most expensive are the costs to society of the consequences of large schools: higher crime rates, increased cost of incarceration, more violence in schools, more families receiving public assistance, and the large number of students whose talents are not fully realized.

The goal of this work has been and will continue to be to offer credible analyses that compare the true costs associated with mega-schools with those of smaller schools. Four specific conclusions emerge from this initial phase of work:

1. Communities should treasure their small schools and policy-makers should protect these schools with sound policies and financial support. State legislators and other decision-makers should implement policy that limits the number of students in a facility to the range suggested in this paper, as well as revise acreage requirements, limitations on renovation, and outdated codes and regulations that promote construction of large schools.
2. Districts should reconfigure large facilities serving narrow grade spans into schools with the widest possible grade span in order to create smaller schools within existing facilities. In addition students and members of the community should make full use of existing facilities for functions and during time periods that extend beyond the activities and hours of traditional schools.
3. The second phase of this work must draw from a more representative base, not just from schools submitted to design competitions for further research, and should examine the costs of maintaining and operating schools of different sizes. The analysis must also seek to understand the differences in costs between smaller and larger schools.
4. The second phase should include an integrated and comprehensive guide for the planning, design, and maintenance of facilities for small schools to demonstrate ways in which districts can control costs when building, renovating, and operating good small schools.

Dollars & Sense demonstrates that small schools offer the best place to create environments in which students, teachers, families, and members of the community can teach and learn effectively. Furthermore, this report challenges the notion that small schools are excessively expensive by showing that facilities for small schools can be built cost effectively. The message is clear: when thinking about schools and school facilities, *think small*.

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Appendix 1

Financing Capital Costs

The extent to which states contribute to local facilities costs varies widely. Alaska and Hawaii fund 100 percent of capital costs. In 2001, New Jersey's Abbot Decision determined that school districts identified as "Abbott Districts" will get 100 percent funding from the state for renovation and new construction. Eleven states provide no funding at all for school capital construction including Idaho, Iowa, Louisiana, Michigan, Missouri, Nebraska, Nevada, North Dakota, Oklahoma, Oregon, and South Dakota. Some states give flat grants on a per student basis (Alabama, Indiana, Kentucky, South Carolina, and Virginia), while others distribute equalized funding to bring low-wealth districts up to a state minimum (Alabama, Connecticut, Delaware, Georgia, Illinois, Kansas, Kentucky, Maine, Maryland, Massachusetts, Montana, New Mexico, New York, Ohio, Pennsylvania, Rhode Island, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming). States including Alaska, Arizona, California, Florida, Georgia, Minnesota, Mississippi, New Hampshire, New Jersey, New Mexico, Vermont, and West Virginia offer state grants to "poor districts that do not have the financial ability to finance their needed capital outlay projects." In West Virginia the School Building Authority (SBA) gives grants for Major Improvement projects and Emergency Needs projects, which are not necessarily distributed to poorer school districts. Four states (Arizona, Arkansas, Colorado, and Tennessee), offer a basic support program to school districts that gives a per pupil allotment regardless of facilities needs (ECS, 2001).

There are several mechanisms that states and local districts use to raise and allocate funds. These include: current revenue or "pay-as-you-go," which only work well in wealthy or large districts; reserve funds set aside by school districts for facilities projects; general obligation bonds usually maturing serially over time and regulated by the state; lotteries; sales tax; and special revenue such as money from the tobacco settlement or lease-rental of state property.

Local districts are responsible for providing some funding in all but two states and do this through property tax, local sales tax, bonds, and other mechanisms. Low-wealth districts face a difficult challenge in finding funds through any of these mechanisms as enrollment may be low, property generates limited tax revenue (Deweese, 2000, p. 1), and there are few businesses providing goods and services to produce revenue from a sales tax.

Appendix 2

Legislation proposed to the Maryland General Assembly by Delegate David Rudolph, February 2001: House Bill 1440

Preamble

WHEREAS, Research indicates that smaller school size is the second most important factor in creating positive educational outcomes, after socioeconomic status; and

WHEREAS, Research related to school size indicates that elementary and middle schools with between 300 and 400 students and secondary schools with between 400 and 800 students are more effective than schools with larger student populations; and

WHEREAS, Smaller school size promotes learning and improves grades and test scores of students, especially minorities and low income students; and

WHEREAS, Research shows that school dropout rates decrease in small schools; and

WHEREAS, Student behavioral problems, including truancy, classroom disruption, vandalism, aggression, theft, alcohol and substance abuse, and gang participation, occur more often in larger schools; and

WHEREAS, Creating smaller schools and smaller learning communities within larger schools promotes school safety; and

WHEREAS, Small schools reduce the feeling of isolation, allow students to form closer relationships with teachers, and create a sense of student loyalty to and pride in the school; and

WHEREAS, Researchers have concluded that the first step in ending secondary school violence is to break through the impersonal atmosphere of large secondary schools by creating smaller learning communities within large schools; and

WHEREAS, Research demonstrates that students who attend smaller schools are more likely to participate in extracurricular activities and to participate in a greater variety of extracurricular activities; and

WHEREAS, Large schools contribute to negative teacher attitudes and low staff morale; and

WHEREAS, Small schools can be established in a cost effective manner, as the sheer size of larger schools requires more administrative support; now, therefore,

SECTION 1. BE IT ENACTED BY THE
GENERAL ASSEMBLY OF MARYLAND, That the
Laws of Maryland read as follows:

Article-Education 4-109.

(a) Subject to approval by the State Superintendent and in accordance with the applicable bylaws, rules, and regulations of the State Board, a county board may establish a public school if, in its judgment, it is advisable.

(b) On approval by the State Superintendent, any school established under this section becomes a part of the State program of public education.

With the advice of the county superintendent, the county board shall determine the geographical attendance area for each school established under this section.

(D) A COUNTY BOARD SHALL TO THE EXTENT FEASIBLE ESTABLISH, AND THE STATE SUPERINTENDENT SHALL ENCOURAGE THE ESTABLISHMENT OF, NEW PUBLIC SCHOOLS TO SERVE THE FOLLOWING MAXIMUM STUDENT POPULATIONS:

- (1) FOR AN ELEMENTARY SCHOOL —
400 STUDENTS;
- (2) FOR A MIDDLE SCHOOL —
600 STUDENTS; AND
- (3) FOR A SECONDARY SCHOOL —
800 STUDENTS.

SECTION 2. AND BE IT FURTHER ENACTED, That
this Act shall take effect

July 1, 2001.

Appendix 3

Methodology

The sample includes projects from the design competition "Learning by Design," organized annually by the National School Boards Association, as well as similar annual design competitions conducted by the Council of Educational Facilities Planners International and two national publications, *American School and University* and *Designshare*. A total of 530 submissions were made to these competitions from 1990 to 2001. Eliminating duplicate submissions and those with missing data on the variables of interest produced a final data set of 489 entries to the four competitions. Median size was determined by grade level for these 489 schools according to number of students per grade: 93 (elementary), 267

(middle school), and 375 (high school). In the case of a 9-12 high school, 375 indicates a total enrollment of 1,500 students: a size that exceeds the most conservative of the upper limits proposed for high school size.

These 489 "cases" each include information about geographic region, designed capacity, number of grades, grade span configuration, total square feet, total cost, and construction type (new construction only, or new construction plus renovation). Several new variables use the existing information: cost per student, cost per square foot, students per grade (the preferred measure of size), and square footage per student. Table 1 provides detailed information on the analysis of the 145 cases representing "reasonably sized" schools.

Table 1
Smaller as Compared to Larger Schools

variable	size category	mean	SD	difference	p
cost/student	smaller	\$16,283.86	\$10,898.68	-\$1,334.54	.44
	larger	\$17,618.40	\$9,886.45		
cost/square foot	smaller	\$104.64	\$44.21	-\$15.26	.152
	larger	\$119.91	\$78.40		
designed capacity	smaller	414.68	151.10	196.24	.000
	larger	610.92	183.16		
students/grade (size)	smaller	99.66	60.59	-70.19	.000
	larger	169.85	90.33		
square feet/student	smaller	150.63	53.62	-10.55	.463
	larger	161.18	109.44		
number of grades	smaller	5.14	2.11	+0.85	.007
	larger	4.29	1.55		

Note: SD = standard deviation

p = significance level (p (.05 indicates statistical significance different from chance).

N= 145 schools under proposed upper limits of school size

Appendix 4

Data compiled by Paul Abramson

An Examination of the Relative Cost of New School Buildings by Type and by Enrollment

Data compiled by Paul Abramson, who assembles comprehensive school construction cost data for *School Planning and Management* magazine, confirms that small schools are being built at reasonable prices and offers another look at building costs. Abramson looked at the construction costs for virtually all of the elementary, middle, and high schools in the United States that were scheduled for completion in the years 2000 and 2001. This group consisted of a total of 944 schools, with a median enrollment of 650 students for the elementary schools, 1,200 students for the high schools, and 800 students for the middle schools. He broke down the schools in two ways for purposes of the analysis. First, he computed construction costs for all the schools in the "top half" in each category (elementary, middle, or high)—i.e., all those with enrollments above the median—and costs for the "bottom half"—i.e., all those with enrollments below the median. Second, he extracted construc-

tion costs for the very smallest schools and for the very largest schools in each category. He looked at: elementary schools of 300 students and fewer and 1,000 or more, high schools of 600 or fewer and 1,600 or more, and middle schools of 500 or fewer and 1,300 or more. The result is a table detailing cost per student, cost per square foot, and square feet per student in the total group for each type of school and for top half, bottom half, smallest, and largest groups for each type of school.

According to these numbers, in this group of schools, costs per square foot and per student are actually lower for the two smaller groups of high schools (1,200 and under and 600 and under)—as compared with the two larger groups (1,200 and larger and 1,600 or larger). Similarly, for middle schools, costs per student and per square foot are lower for the two smaller groups of schools (under 800 and under 500) than for the large half (800 and larger). Only the largest middle schools (1,300 or larger) show cost savings, and even then they are more expensive to build than those in the small half (under 800). Only in the elementary category are the smaller schools more expensive to build in every case. Nevertheless, the differences are not so substantial as to offset the benefits provided by the smaller schools.

Table 2
Cost of Constructing New Schools by Size Category

	all schools	low half	smallest	large half	largest
Elementary Schools	All elementary schools (652)	Under 650 (326)	300 and under (18)	650 and larger (326)	1000 and larger (23)
Median enrollment	650				
Cost per square foot	\$116.67	\$123.18	\$156.38	\$111.11	\$90.91
Cost per student	\$13,707.07	\$14,166.67	\$20,867.00	\$12,500.00	\$10,000.00
Square feet per student	111.55	115.00	133.30	109.28	110.00
High Schools	All high schools (157)	Under 1200 (79)	600 and under (20)	1200 and larger (78)	1600 and larger (21)
Median enrollment	1200				
Cost per square foot	\$118.81	\$114.26	\$96.28	\$124.44	\$133.33
Cost per student	\$17,500.00	\$16,237.43	\$15,125.00	\$18,181.52	\$18,045.45
Square feet per student	145.83	140.65	140.65	154.70	144.70
Middle Schools	All middle schools (135)	Under 800 (68)	500 and under (20)	800 and larger (67)	1300 and larger (8)
Median enrollment	800				
Cost per square foot	\$123.27	\$115.38	\$122.22	\$125.60	\$120.91
Cost per student	\$16,428.57	\$15,428.57	\$16,800.00	\$17,153.54	\$14,615.38
Square feet per student	135.00	133.33	134.17	135.00	124.33

Based on data from 944 projects scheduled for completion in 2001 and 2002. Median enrollment is median enrollment for this sample. Data was compiled by School Construction Alert (203-225-4751), a service of Dun & Bradstreet's Market Data Retrieval division, for use in *School Planning and Management* magazine's annual school construction report. Paul Abramson of Intelligence for Education, Inc. (914-834-2606) made a special analysis of the data for this table.

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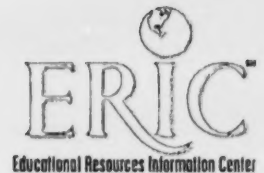
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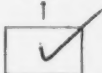
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